HABITAT PREFERENCE OF AVIAN FAUNA: STUDY OF WETLANDS OF AJMER, RAJASTHAN

पक्षी समूह की आवासीय प्रायिकताः राजस्थान के अजमेर जिले के आर्द्र क्षेत्रों का अध्ययन

A

Synopsis submitted for the Degree of

Doctor of Philosophy (Ph.D.) in

Zoology

to

SAMRAT PRITHVIRAJ CHAUHAN GOVT. COLLEGE, AJMER

MAHARSHI DAYANAND SARASWATI UNIVERSITY

AJMER

2015

Submitted By

Umesh Dutt

Under the supervision of

Dr. Bharti Prakash

Lecturer in Zoology

S.P.C. Govt. College Ajmer

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APPENDIX- IV

FORMAT FOR OUTLINE OF PROPOSED RESEARCH WORK

1. **Name of Scholar (In English)** : UMESH DUTT

   (हिन्दी में) : उमेश दत्त

2. **Title Of Research Work** : HABITAT PREFERENCE OF AVIAN FAUNA: STUDY OF WETLANDS OF AJMER, RAJASTHAN

   (हिन्दी में) : पक्षी समूह की आवासीय प्रायिकता: राजस्थान के अजमेर जिले के आर्द्र क्षेत्रों का अध्ययन

3. Location

a. Institution / Department where the work is to be done.
b. Geographical area of investigation: If any
2. Importance of proposed Investigation.
3. Review of work already done on the subject of proposed research study.
4. Research gaps identified in the proposed field of investigation.
5. Objectives.
6. Major Hypothesis, If any
7. Materials and methods/Research methodology.
8. Chapter wise details of proposed research:
9. Bibliography

Outline Approved
Bharti Prakash 19/12/15
Name and signature of supervisor
with date and seal
व्याख्याता
प्राणी शास्त्र विभाग
राजकीय महाविद्यालय, अजमेर

Signature of
Candidate with date
19/12/15

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3. **LOCATION :**

(a) Department of Zoology, S.P.C. Government College Ajmer, Rajasthan

Geographical area of investigation:

Profile of Study Area:

Area under investigation is in Rajasthan state, the largest state of India. Major part of the state is covered by desert. Aravalli hills diagonally divide state and delimit desert into two distinct ecological regions. Rajasthan, situated at northwestern part of India is the biggest state in the country and lies between 23°30' and 30° 11' North latitude and 69° 29' and 78° 17' East longitude. Aravalli range forms chief topographical features in Rajasthan which diagonally bisects state into 3/5th western region and 2/ 5th eastern semi- arid zone with a total area of 3,42,239 square kilometers, which accounts 10.41% of geographic land area of country. This state stretches lengthwise 869 km. from west to east and 826 km. from north to south.

Central part of the Aravalli mountains is also known as Merwara hills this is the thinnest part of the mountain range. Average altitudinal level of central Aravalli tract is 550 meter. There are only few peaks that rise above 800 meter and Taragarh (855 meter) is the highest point in the neighborhood of Ajmer district.

The Aravalli mountain range of Rajasthan with coordinate 26^0 16' N - 75^0

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25' E and 26^0 27' N - 74^0 42' E with an area of 8,481 Km^2. Study area is classified as semiarid zone of central Aravalli foothills and mean annual rainfall is 573 mm and temperature ranges from 2^0 to 46^0 C. In the state, Ajmer district have certain perennial and annual fresh water bodies, such as Anasagar lake and Foysagar Talab. For the compilation of present study these wetlands are selected as the study sites since each has characteristic features relation to habitat availability.

4. IMPORTANCE OF PROPOSED INVESTIGATION.

Birds are designated as glorified reptiles and they have a long history of evolutionary significance. Several bird species are designated as biological indicators of the habitat or ecosystem health. Thus, most of the avian species are highly confined to a specific habitat requirement i.e. habitat characteristics or habitat preference or habitat health. Birds have great economic and personal value to people. Birds disperse seeds and also help to control rodents, insects and other pests that would otherwise devastate crops, forests, and ecosystems.

Water birds comprise a large group of species. Wetland supports congregation of large number of migratory and resident bird species as it has high nutritional value as well as productivity. The bird distribution is mainly dependent on various factors like food availability, size of wetland, abiotic and biotic factors and anthropogenic pressure on the wetlands. The quality of habitat is important in water bird habitat assessment because a favorable conditioned habitat is most utilized area whereas contaminated or unhealthy habitat is least preferred by the birds. The physico-chemical characteristics of the water largely determine the water bird community of wetland habitats, primarily by their direct and indirect impact on the availability and abundance of food and shelter. Overall occurrence of lower life forms also influence the birds utilizing that particular habitat. These

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birds play an important role in energy movement in the wetlands and also play vital role to maintain variety of food chain and food web in different ecosystem.

Wetland birds are especially sensitive to habitat changes and require certain habitat types. Most of the wetlands in Indian scenario have been subjected to agricultural development, urbanization, sewage mixing and other anthropogenic pressures. Thus, wetland birds species are facing habitat loss due to these reasons as well as complex migration dynamics. Anthropogenic activity may also be a key factor affecting the wetland avifauna.

The proposed research investigation has been selected in view of lack of information related to the distribution account about wetland birds and habitat characterization or preference. Therefore a detailed scientific and systematic study of our research would help us to know about present species account. Simultaneously proposed investigation would also gather information about occurrence of any particular species in study area along with its habitat requirement and preference. The outcome of research would help to get information about the occurrence, distribution and habitat preference of the avian diversity at study area. Simultaneously, the habitat characteristics shall be evaluated and recommendations for the health improvement of wetlands would be suggested to policy makers.

5. REVIEW OF LITERATURE

Birds are one of the most fascinating individuals of the animal kingdom. Birds are inhabited in all possible habitats of globe. Chilke (2012),has identified 9,000 species around the world .

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Water birds or wetland dependent birds occur on wetland, often in spectacular concentrations, and are one of the most qualified indicators of the richness and diversity of productive ecosystems. Bird Life Int. (2003) has reported that the main pressure on water birds are wetland drainage and conversion, including the infilling of intertidal coastal wetlands, principally for agriculture purpose It has also reported that dam and other water storing projects negatively affect the birds residing in such areas.

Kent (1986, 1987) and Erwin (1983) studied the various effects of behavioral ecology in respect of foraging efficiency, feeding, nesting site selection, spatial use, social interactions, and fragmented habitat utilization of egrets at varied types of habitats. According to Odum (1971) to conserve a species it is the best to conserve the whole habitat that support other ecological important species too i.e. habitat based conservation of species of interest. Lack (1967) suggested the importance of ancestral habitat for the various avian species. MacArthur and Levis, (1967) reported the characteristic properties of foliage height and diversity is a major factor for the land bird species distribution and habitat preferences. Custer and Osborn (1978) described the feeding habitat and use of colonially characteristics for the successful survival and increased rate of breeding capabilities of herons, egrets and ibises in North Carolina. Nearly similar studies were carried out with white ibis, longer-legged heron and for other species of herons by Kushlan, (1976a, b, c), Meyerriecks (1962). Rodgers (1983) described the foraging behavior of herons in different habitat in Florida.

Feeding habits and feeding preferences of night heron and little egret in varied agricultural and non-agricultural habitats in Italy was described precisely by Fasola (1981, 1986). Several other species of waders at tropical wet Savannas was also studied by Kushlan *et al.* (1985), in reference to the foraging, niche relations

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and microhabitat characteristics. Habitat use, utilization preferences and characterization for the herons and egrets in North America was illustrated by Recher and Recher (1980). Prey size selection, seasonal variation in food item selection of wood storks was thoroughly studied at Everglades National Park, United States by Ogden *et al.,* (1978); Cooper, (1985a); Hafner and Brittons, (1983); Hafner, (1982); Kushlan and Kushlan, 1977; Kushlan, 1981; Mock and Mock, 1980).

Recently scientists around the world have shown keen interest in studying the indicators of wetland quality i.e. biological indicators mainly the birds; and they can be identified as a significant parameters of restoration success and regional biodiversity (Weller, 1999). Weller and Spatcher (1965) and Beecher (1942) described the key features of the wetland birds that helps them to adapt in the fluctuating environmental conditions of their respective habitats and the adaptations of wetland birds to the different habitats and various eco-biological parameters. Bibby *et al.* (1992) described the proper methodology of birds that can be adopted for the census study of bird population in a limited area. Rabe (2001) described the breeding behavior of various wetland birds that showed unique breeding behavioral ecology at Michigan natural areas. Bennetts *et al.*(2000) evaluated the influence of environmental and density-dependent factors (intraspecific and interspecific) on clutch size, brood size, and nesting success of little egrets (*Egretta garzetta*) in Camargue of southern France.

Indian subcontinent is classified as one of the eleven mega biodiversity areas of world. In terms of habitat characteristics two biodiversity hotspots Himalayan region and Western Ghats are identified. According to Kumar *et al.*,(2005), India has 243 species of water birds and 67 species of wetland dependent and associated birds.

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The estimation of wetland quality can be assessed by proper monitoring of the population of wetland birds. Few significant studies have contributed in such type of research mainly based on reports on birds of prey (Prakash, 1988), ducks (Sridharan, 1989; Bhupathy, 1991). Field characteristics, population status, distribution pattern and the general ecology of species occurring in Indian continent have been reported by Baker (1922-32, 1932-35), Whistler (1935), Ali and Ripley (1983), Bhupathy (1985) Jayaraman (1985). However, the habitat characteristic or habitat preference based studies are almost negligible and need more scientific support regarding habitat conservation. Kahl (1972a, 1972b) described the seasonal variations in feeding preferences and food selection procedures in habitats of certain species of storks.

Rajasthan has certain ecologically important lakes and wetlands specially situated in the eastern region, but due to anthropogenic pressure, sewage mixing and encroachment at the catchment areas these lakes and wetlands are struggling for survival (Devarshi, 2008).

Chahangani (2004) did pioneer studies on road transients of the protected areas and its impact on the avian diversity at Kumbhalgarh wildlife sanctuary, Rajasthan.

Certain significant but scattered studies are also identified in the Rajasthan scenario in respect to avian fauna, its distribution, occurrence, ecological relevance with habitat and habitat preferences that was compiled by the several workers of concerned field (Sahrma *et al.*, 2015a, 2015b, Bhatnagar and Shekhwat, 2014; Sharma and Soni, 2014; Lawaniya *et al.*, 2014a, 2014b; Sathyanarayana *et al.*, 2014; Lawaniya *et al.*, 2013; Sahrma *et al.*, 2013, 2012a, 2012b; Bhadouria *et al.*, 2012; Mohan and Gaur, 2008).

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6. RESEARCH GAPS IDENTIFIED IN THE PROPOSED FIELD OF INVESTIGATION.

Birds are one of the most studied components of the biodiversity around the globe. But such studies are restricted to only globally recognized areas or forest areas. Ajmer is one of the fast developing district of Rajasthan. Significant changes in the land use pattern are dominant in present time around study area. This would definitely have impact upon the avian diversity in Ajmer district and that needs to be evaluated by proper scientific methodology. Birds are highly specialized for their habitat requirements and any change in their habitat shows impact on the occurrence, distribution and habitat preference.

Thus, present study may help to prepare a database regarding occurrence, distribution, habitat characterization and habitat preferences of the avian diversity at study area. Along with the consequences influencing the avian diversity of study area it would also be helpful in preparing a methodology to evaluate such factors at global level. Nevertheless there is still a gap in the research activity of wetland habitat (ecological) and their interrelationship with wetland birds.

The present investigation would provide the information which could help in the management of habitat and population monitoring of these species in the present contest. The outcome of proposed study shall fill these research gaps in the area of enrichment habitat, selection based identification and monitoring of wetland birds .

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7. OBJECTIVES:

The present study has been undertaken with the following objective:

1. Documentation of occurrence, distribution, and population of avian diversity with special reference to wetland birds.

2. To evaluate the habitat characteristics to find out the key features of the wetlands.

3. To find out the eco-biological factors influencing the wetland bird population.

4. Recommending some practical measures for proper management of these wetlands bio-diversity conservation.

8. MAJOR HYPOTHESIS:

The bird distribution is affected by various factors like the food availability, the size of wetland and water quality in the wetland. Eco-biological conditions and wetland birds may have significant inter-relationship of wetland habitat and habitat preference according to ecological variations.

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9. RESEARCH METHODOLOGY

Present investigation will comprise of proper scientific methodology that will consist of two steps.

(1) Surveys: For the present study random surveys will be carried out for the assessment of the avian faunal diversity and their behavioral activity to understand the status of wetland birds. For achieving the goals of proposed investigation ad-hoc, transect, visual encounter, point count, call count etc. protocols will be used. Data outcome shall also be used for the population abundance evaluation with the help of various indices such as Shannon-Weaver, Simpson, Jaccard and Sorensen etc. diversity indices.

(2) Hydro-biological sampling: Regular water samples will be carried out for physico-chemical study during study period to find out ideal ecology of wetland and aquatic habitat. Methodology shall be used as suggested by International norms by APHA (1988).

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Expected duration of proposed Research work

The proposed research work will be completed in two year. The year wise details are as follow:

During I year:

- General surveys of site areas and study of avian faunal diversity for research work in Ajmer in selected swamps and large water bodies.
- Photography and video recording of birds from different study sites related to study area and behavioral activities such as breeding, feeding, nesting ,mating and competition .
- Collection of literature particularly related to research methodology based.
- **During II year**:
- Analysis of the collected data in comparable form along with the statistical tests and their analysis.
- Graphical and tabular presentation of data.
- Compilation of the work and preparation of the thesis.

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10. CHAPTER WISE DETAIL OF PROPOSED RESEARCH

The chapters of the thesis are proposed as follows:

1 Introduction

2 Review of literature

3 Material and methods

4 Observation

5 Result and Discussion

6 Conclusion

7 Summary

Bibliography

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Facilities available for the research work:

All the necessary research facilities required for the proposed study are available at the Post Graduate Department of Zoology, S.P.C. Government College Ajmer.

Signature

Head Department of Zoology,

S.P.C. Government College Ajmer.

प्रभारी
प्राणीशास्त्र विभाग,
राजकीय महाविद्यालय, अजमेर

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Appendix-VI

Certificate by Supervisor

Certified that:

I am willing to guide the research of Mr. UMESH DUTT on the above subject if he registered for Ph.D.

To the best of my knowledge, the subject selected has not been studied and is not being studied so far in any University.

The subject is of sufficient scope to keep the candidate engaged for two year.

The subject will lead to a valuable contribution. I have seen and approved the outline and bibliography, etc. submitted by the candidate.

Necessary facilities are available in the department for the above research work, (certificate from principal/head university department with regards to facilities available is enclosed.)

I have.....02.....Research candidate registered under my supervision and the serial number of this candidate whose application being forwarded for registration is.....03.....

The candidate is not in a close relation (the term of close relation is defined in the examination ordinance of the University).

Bharti Prakash 19/12/15

Signature of the supervisor With date

CERTIFICATE

Certified that the available facilities will be extended to Mr. Umesh Dutt for research work if he registered for Ph.D.

Signature of the Principal/

Director of the Institution with date

प्राचार्य
राजकीय महाविद्यालय, अजमेर

Signature of the Head

Department with date

प्रभारी
प्राणीशास्त्र विभाग,
राजकीय महाविद्यालय, अजमेर

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